



Penguin Conservation

The Penguin TAG Newsletter

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From the Editors

In this issue, we provide information about the use of infrared thermography (IRT) as a potential tool for analyzing pododermatitis (bumblefoot) in penguins. IRT has been used with some success as a non-invasive method for detecting inflammation in zoo and domestic animals. To determine if this could be beneficial for use with penguins, Dr. Ann Duncan (Detroit Zoo) used thermal imaging combined with a series of physical examinations to evaluate a study group of penguins at the Detroit Zoo.

David McFarlane (Yellow-eyed Penguin Trust) provides an update on the continued challenges yellow-eyed penguins are facing. (See **PCN** Vol 18, No 2 for original articles). Poor reproduction over the last three breeding seasons has led to a drastic population decline; this has been further compounded by the reoccurrence of avian diphtheria, and injuries from recent barracuda attacks. The YEPT is working with a local veterinary lab that is trying to identify the suspected virus and develop a treatment regime, which may potentially lead to the development of a vaccine.

We are excited to report on development of two very significant penguin conservation initiatives: the approval by the IUCN Species Survival Commission of the establishment of a Penguin Specialist Group and the development of AZA SAFE (Saving Animals From Extinction). The PSG aims to provide the most relevant information on penguin biology, ecology, science and conservation to advise resource managers and policy-makers, and to inform and influence the development of effective conservation action plans. AZA SAFE aims to combine the resources and expertise available to AZA through its members, partners, and visitors to help save species from extinction. African penguins have been identified as one of the species which will receive support from this program.

The Avian Scientific Advisory Group (ASAG) in cooperation with the Penguin TAG held a *Penguin Husbandry Workshop* at the AZA Mid-Year meeting in Columbia, South Carolina this past March. Penguin experts from a variety of disciplines conveyed new and relevant information on a number of topics. The information presented serves to further advance the knowledge and skills of those working with penguin species *ex situ*.

Stephanie Allard and Grace Fuller (Detroit Zoo) describe a penguin behavioral study initiated at the Detroit Zoo. The Detroit Zoo is currently constructing the Polk Penguin Conservation Center (PPCC), a new, state-of-the-art facility which will include a highly enriched environment for penguins. Representatives of the four species currently living at the *Penguinarium* are participating in a pre- and post-occupancy study to evaluate how they react to their current and future environment. The information gathered will be used to identify the ways in which we can positively impact their wellbeing.

Dr. Paul Ponganis (Scripps Institute of Oceanography) successfully tested a camera backpack on emperor penguins at SeaWorld San Diego's *Penguin Encounter*. This pilot study was used to determine how the penguins would tolerate the backpacks and if good quality images could be obtained. Ponganis plans to use these on emperor penguins in Antarctica to track their dive patterns and document prey items during foraging trips.

The sustainability of *ex situ* penguin populations is reliant upon adequate genetic diversity. Dr. Justine O'Brien (SeaWorld San Diego) describes the methods used to collect semen from non- or underrepresented male king penguins at SeaWorld San Diego's *Penguin Encounter*. This procedure allows for the collected sperm to be analyzed for viability and potentially used for artificial insemination.

In response to the positive feedback we received from the enrichment article in our previous issue, we include a few more ideas and hope to continue to provide this information as a regular feature. We ask that you please send your enrichment ideas and training methods to the editors for inclusion in subsequent issues.

We wish to thank all of our contributors: Drs. Ann Duncan, Stephanie Allard and Grace Fuller (Detroit Zoo), David McFarlane (Yellow-eyed Penguin Trust), Dr. Paul Ponganis (Scripps Institute of Oceanography), Dr. Justine O'Brien (SeaWorld San Diego), Steve Sarro (Smithsonian's National Zoo), Popi Borborglu (Global Penguin Society), Gayle Sirpenski (Mystic Aquarium), Sara Mandel (Aquarium of the Pacific) and Vicky Croisant (Akron Zoo).

Penguin TAG Steering Committee

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Penguin TAG Mission: To provide leadership for the management of penguins *ex situ* in order to maintain healthy, sustainable populations for the purpose of:

- ◆ Engendering appreciation for these charismatic species that are indicators of the health of marine and coastal environments.
- ◆ Promoting conservation concern and conservation action through education programs and internet resources.
- ◆ Furthering *in situ* conservation and research in support of *ex situ* management.

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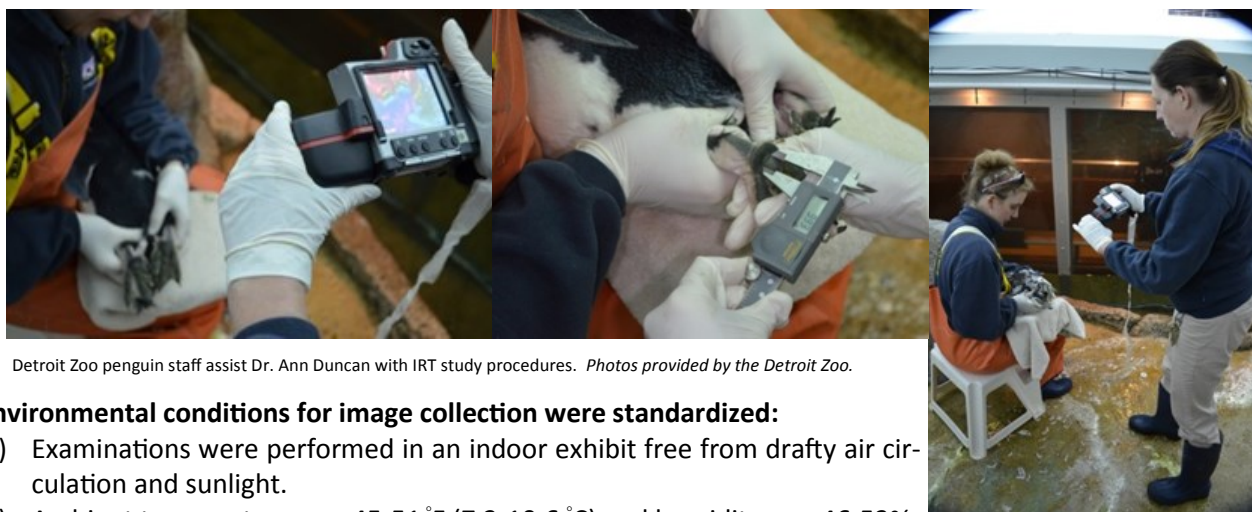
Infrared Thermography for Detection of Bumblefoot in Penguins

Ann Duncan, DVM; Detroit Zoological Society, Royal Oak, MI, USA

Bumblefoot (BF), or pododermatitis, is an important health problem in penguins ex situ, and has significant impact on the welfare of this population.¹ Early identification of lesions allows initiation of treatment and improves treatment success.² At the Detroit Zoo, we have had a number of penguins develop bumblefoot over the years, and we were interested in determining if thermal imaging could help us identify birds that were developing lesions. The goal of the study was to validate infrared thermography (IRT) as a diagnostic tool for detection of BF at clinical or subclinical levels in penguins. IRT is a rapid, noninvasive measure that has been found useful for detection of early BF in chickens. Our hypothesis was that feet with active BF would have higher surface temperatures than feet without active BF.

MATERIALS AND METHODS

The study population included 17 king penguins (*Aptenodytes patagonicus*), 28 macaroni penguins (*Eudyptes chrysolophus*), and 24 rockhopper penguins (*Eudyptes chrysocome*). Each penguin was evaluated every 3 months for a total of 6 exams. At each exam, a series of 3 thermal images was taken over a period of 3-4 min, two high-resolution digital images were taken and foot exams were performed. Thermal images were taken using a FLIR T400 infrared camera at a distance of 0.46 meters.



Detroit Zoo penguin staff assist Dr. Ann Duncan with IRT study procedures. Photos provided by the Detroit Zoo.

Environmental conditions for image collection were standardized:

- 1) Examinations were performed in an indoor exhibit free from drafty air circulation and sunlight.
- 2) Ambient temperature was 45-51 °F (7.2-10.6 °C) and humidity was 46-53%.
- 3) Prior to each exam, penguins were placed on Dri-dek® flooring covered with two layers of towels for at least 20 min to provide insulation and keep the feet clean and dry.
- 4) A foam pad was used to offset the feet and reduce thermal noise from the environment.
- 5) The feet were patted dry if needed, and restrained as minimally as possible.

The skin on the plantar aspect of the feet was examined and lesions were classified by location and type (crack, callous, core). Each lesion was scored as **active** if there were signs of inflammation or epithelial compromise sufficient to allow infection to occur, and **inactive** if the epithelium was intact. Finally, lesion dimension was measured to the nearest 0.1 mm using digital calipers.

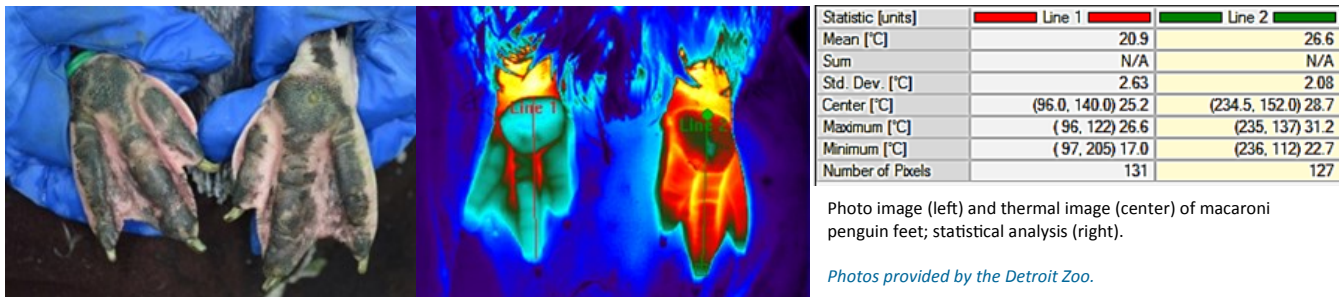
THERMAL IMAGE ANALYSIS

Image analysis was performed using a line method adapted from the study of bumblefoot in poultry.³ A median line was drawn through each foot, and the maximum temperature, minimum temperature, mean temperature and temperature difference (TD) were calculated from points on this line. These parameters were

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compared for feet determined to have active lesions, inactive lesions and no lesions during examination.



RESULTS

Statistical analysis was performed to assess the relationship between lesion status (active, inactive or no lesion) and the various temperature measures. The time off of the ground was considered in the analysis to see if this impacted the results. When analyzing the data, it was observed that an individual penguin could show very different thermal measurements from one exam to the next.

A subset of 10 penguins with an active lesion on one foot and an inactive or no lesion on the other were identified. By comparing one foot to the other in the same penguin at the same examination, the variability seen between examination sessions was removed and each penguin was able to act as its own physiologic control. A difference of 1.59 °C was seen between mean temperatures on active versus inactive feet, and Wilcoxon signed-rank tests revealed that this was significant ($V_{127} = 6116$, $p < 0.0001$), however further statistical analysis showed that this difference was not attributed to the lesion status, and was therefore not significant.

CONCLUSION

There was too much variability seen from one exam to the next, and this impacted the value of thermal imaging for detection of bumblefoot. We were able to determine that the time off of the ground had an impact on the results, and should be considered in any further studies. Some penguins had either very warm or very cool feet during image collection, and this impacted the sensitivity of the test. Penguins are known to use countercurrent circulation to conserve heat, and we suspect that this, activity level prior to exam and other unknown factors may have contributed to the variability seen. Our overall assessment is that examination alone provided the same information as thermal imaging in this study. Regular examination improved our understanding of lesion progression and healing, and has led to several husbandry changes that have decreased our incidence of bumblefoot significantly. Since this study, we are examining penguins with a history of bumblefoot quarterly, and examining all of our penguins prior to molt. Penguins with inactive lesions are treated daily with ointment. Any penguins with active lesions are housed on cat litter and treated with topical ointments until the lesions resolve. Also, based on our understanding of bumblefoot, we are incorporating a variety of substrates into the design of our new Polk Penguin Conservation Center, scheduled to open in 2016.

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Acknowledgments: The author would like to thank the AAZV Wild Animal Health Fund for funding this research, and the Detroit Zoo penguin keeper staff (Lindsay Ireland, Mike Puppan and Sara Baer) and veterinary staff (Erica Campbell and Amanda Dabaldo) for their dedication to this project.

Update: Rapidly Unfolding Crisis Threatening Yellow-eyed Penguins

David McFarlane, *Field Manager; Yellow-eyed Penguin Trust, New Zealand*

[Eds. Note: David sent this article to us in December 2014. In his correspondence he mentioned a visit to Long Point where he commented “I...was staggered to find chicks still hatching, as this is up to 4 weeks later than normal... ‘normal’ these days seems to have been completely turned on its head!”. The following article highlights the challenges and needs for yellow-eyed penguins.]

The Yellow-eyed Penguin Trust (YEPT) is a non-profit in need of funding to respond to the diphtheria findings in chicks as well as to help rescue yellow-eyed penguins injured by barcouda (barracouta or barracuda) predation. The YEPT has received an influx of donations in recent months through a Facebook campaign but more is needed to support the YEPT’s important work. It is hoped that by appointing a conservation scientist the YEPT can better understand how to bring yellow-eyed penguins back from the brink. If you or your organization are able to contribute please contact the YEP Trust at the email provided or join the conversation on Facebook by hitting “Like” at www.facebook.com/yepttrust.]

As reported in the November 2014 (Volume 18; Number 2) issue of Penguin Conservation, yellow-eyed penguins are confronting a range of threats including disease and poor foraging.

Among these threats, nest searching in mid-October on mainland New Zealand and Stewart / Codfish Island have also shown dramatic declines in the numbers of nesting pairs. For example, the numbers of pairs breeding on the Otago Coast have dropped from 439 in 2013/14 to 235 in 2014/15. And at the Trust’s Long Point Reserve (Catlins District, south of Otago Peninsula) nest numbers have dropped from 48 to 28. Of particular concern to the Trust is further evidence of a long term decline on Codfish / Whenua Hou (off the north-west coast of Stewart Island) reflected in just 32 nests found, down from 61 in 2001.

It is suspected that the combination of adult deaths on Otago Peninsula (2012/13), poor foraging and chick starvation and late moulting (2013/14) have resulted in birds either leaving the breeding population, unable to find breeding partners or skipping a breeding season. Compounding these dismal figures has been the re-occurrence of avian diphtheria.

I spent a day in the field (20 November) with staff from the Ministry for Primary Industries (MPI), Department of Conservation, and our new YEPT seasonal ranger Jim Watts, who has been employed by the Trust to work on the avian diphtheria investigation, looking at recently hatched chicks at our Otapahi & Okia reserves. This was a deeply alarming and distressing experience with almost all the chicks showing the signs of early avian diphtheria lesions making breathing and swallowing difficult.

Two of the chicks from one of the Okia nests died a day or two later and have been sent for further examination at Massey University Veterinary School. There has been a little good news: some chicks have not gone on to develop full-blown diphtheria despite displaying symptoms. These chicks look as though they will recover.

Swabs and scrapings have been taken from all the chicks in the investigation and will be analysed at a local Dunedin veterinary laboratory and MPI-Wallaceville in Upper Hutt to try to identify a suspected virus. Okia and Otapahi chicks are serving as the control and won’t receive treatment, while chicks at another site will receive different treatments. These treatments include lesion removal and probiotic oral treatment, chlorhexidine spray, food and fluids or antibiotics. It is hoped that a recommended treatment regime will be determined that can be used in the future and possibly even lead to the development of a vaccine.

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This has been the third disastrous yellow-eyed penguin breeding season in a row and as a conservation manager I am left profoundly depressed about the future of the mainland yellow-eyed penguin population without an energetic and co-ordinated strategic approach to investigate the underlying causes.

What to do now? The Yellow-eyed Penguin Trust is continuing to search for financial support to establish a conservation scientist position and pursue a joint programme of marine-focused disease research with the University of Otago and Massey University. We all realize such funding is very difficult to obtain, but if you want to help secure the future of the world's rarest penguin contact the **Yellow-eyed Penguin Trust, PO Box 5409, Dunedin 9058, New Zealand.**



Four to five day old YEP chick YEPT Okia Reserve 20 November 2014.



Checking YEP chick for avian diphtheria lesions YEPT Okia Reserve 20 November 2014.



Yellow-eyed penguin chick with severe avian diphtheria lesions on sides of mouth YEPT Okia Reserve 20 November 2014.



Measuring YEP chick YEPT Okia Reserve YEPT 20 November 2014.

All photos provided by the Yellow-eyed Penguin Trust.

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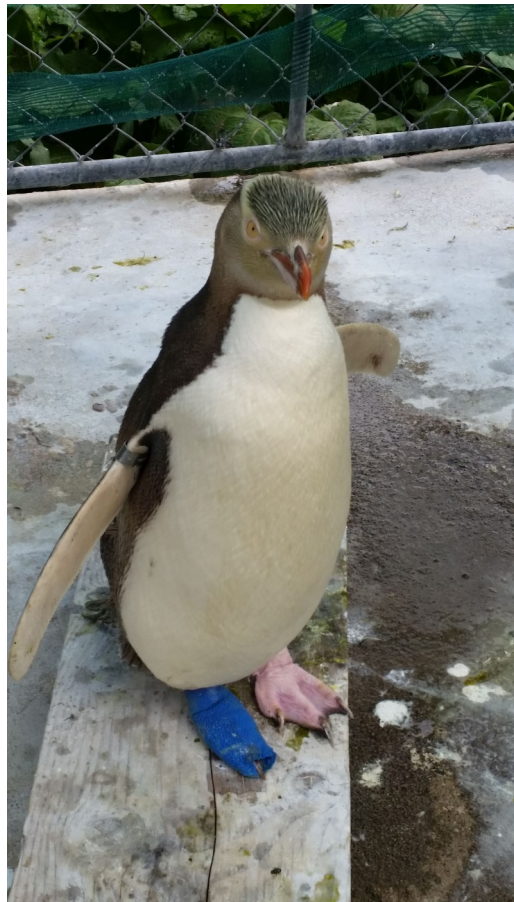
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[Eds. Note: Regarding the barracuda predation, Dave commented in a March 2015 email correspondence "...everyone in the yellow-eyed penguin community is surprised at how this has developed and the number of birds affected. Up to 2-3 weeks ago 45 injured yellow-eyed penguins had been taken into care, often requiring surgery followed by lengthy rehabilitation. No real explanations as to why this is happening. Barracuda bites are an issue from time to time but not in these numbers."]



Yellow-eyed penguin foot injuries from barracuda bites.

Photos provided by Wildbase: Massey University, New Zealand.



Penguin Specialist Group Established

The following press release was provided by Popi Borboroglu. Popi further explained that they are working to nominate a UNESCO Biosphere Reserve to include 20 Magellanic penguin colonies. And, he says, the Global Penguin Society (GPS) is working with Government to create Marine Protected Areas for Punta Tombo (the largest Magellanic penguin colony on Earth). Readers may know that Popi recently addressed the United Nations during a high –level symposium “ONE OCEAN: achieving sustainability through sanctuaries”. Read more at the GPS website www.globalpenguinsociety.org by clicking on the red “News” button. The PCN plans to provide further updates in forthcoming issues.

The IUCN Species Survival Commission (SSC) has recently approved the establishment of the **Penguin Specialist Group (PSG)**. This newly formed group arose largely from enthusiastic experts from around the world, active in penguin conservation and/or research and keen to contribute their ecological and biological knowledge to further the conservation of all 18 penguin species. Simon Stuart, Chair of the SSC, appointed Pablo G. Borboroglu (Popi) and Dee Boersma to serve as Co-Chairs of the group. The PSG will, among other key objectives, synthesize information on penguin biology, conservation and scientific literature to inform conservation action plans and advise resource managers. The PSG will seek to play a key role in addressing international conservation issues requiring a higher level of political engagement e.g., the illegal traffic of penguins, oil pollution, or negative interaction with fisheries in international waters. It will also focus on assisting BirdLife International with the revised Red Listing of penguins by providing advice on penguins into international policy fora. The Global Penguin Society (GPS) fostered the initiative for PSG by engaging individuals and organizations to promote its establishment. The GPS will provide the initial



source of financial support and is seeking further help from other national and international organisations involved in penguin conservation, research and/or advocacy. At a time when thousands of species are on the edge of extinction, and the threats to biodiversity are rapidly escalating, preserving the diversity of life on Earth requires strong global collaboration and help from all sectors of society.

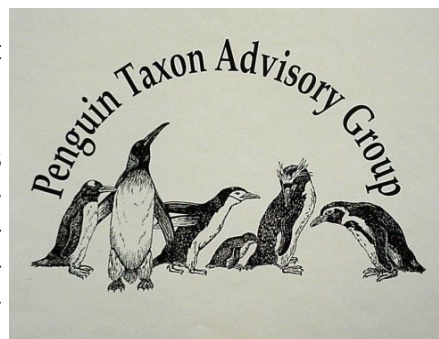
The group is in the very early stage of its formation. Announcements are forthcoming concerning its structure, function, and ways for individuals and organizations to be involved.

Popi Borboroglu - pgborbor@cenpat-conicet.gob.ar or popi@uw.edu

Dee Boersma – boersma@uw.edu

The Avian Scientific Advisory Group (ASAG) Holds Penguin Workshop

The Avian Scientific Advisory Group (ASAG), in cooperation with the Penguin TAG, held a **Penguin Husbandry Workshop** during the recent AZA Mid-Year Meeting in Columbia, South Carolina. The workshop on 23 March brought together penguin specialists from a variety of disciplines. Following the morning workshop session an *Open Lunch Discussion* was convened centered on the topic **Improving sustainability across different penguin species**. As well, there were two penguin-related presentations at other ASAG workshops. The Avian SAG - Reproductive Management and New Technology Workshop included a presentation on managing an artificial insemination program for Magellanic penguins. The Avian SAG - General Session on Wednesday, March 25, featured a presentation from the 2014 ASAG Grant recipient on evaluating corticosterone responses in ambassador penguins participating in behind-the-scenes tours. Abstracts for the presentations are listed below. More detailed articles may be featured in upcoming issues of the PCN. Consider a donation to ASAG to support Zoo and Aquarium avian programs, conservation of bird species and to advance avicultural knowledge. Learn more at www.aviansag.org.



Introduction/TAG Updates - Tom Schneider, Detroit Zoo

There was a review of the Penguin TAG's 2014 achievements including publishing the Animal Care Manual, completion of Population Viability Assessments for all program species, and submitting the Regional Collection Plan. Tom further discussed the TAG's goals for the next five years.

Penguins as Marine Sentinels: Building Science Partnerships - Dee Boersma, University of Washington, Global Penguin Society, Penguin Sentinels

Penguins are ocean sentinels. Long-term data can reveal what they are telling us about marine and coastal ecosystem health and how to balance the needs of penguins and people. Over half of penguin species are on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The Global Penguin Society (GPS) is focusing attention on the plight of the penguins and is helping to support an IUCN penguin specialist group. Conservation in the wild is the best long-term solution. Success will depend on partnerships and must be built on science. Understanding the problems that wildlife face is the first step toward creative solutions.

Research on oiled penguins in Argentina in the 1980s fueled public action to move tanker lanes farther offshore (1994) and curb illegal bilge dumping. Annual censuses of the Magellanic penguin breeding population at Punta Tombo show a decline of over 20% in 30 years. Reproductive success is highly variable and years of lowest reproductive success had 60 mm of rainfall between October to December, when penguins had eggs and chicks. Climate change is already impacting the population, as egg-laying dates at Punta Tombo are later, by about 3 days per decade, than the early 1980s. Research shows food for young chicks is a problem, yet no Marine Protective Reserve at Punta Tombo is in place.

Solutions for all penguins are not the same. For Galapagos penguins, building the population by providing shady, high-quality nests may be the most effective solution. For Yellow-eyed penguins disease control may be most critical and for African penguins closing fisheries around breeding sites may be required. Penguins in zoos and aquariums are ambassadors to help penguins in the wild. We should use their full potential to help penguins in the wild.

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ASAG Penguin Workshop Continued from page 8

African Penguins: A Pilot Species for AZA's New SAFE Program - Steve Sarro, Smithsonian's National Zoo and Gayle Sirpenski, Mystic Aquarium

The wild population of African penguins today is a mere 2.5 % of what it was just 80 years ago. In November 2014 members of AZA's SAFE (Saving Animals From Extinction) team and the co-coordinators of the African penguin SSP traveled to South Africa to participate in a stakeholders meeting in Cape Town to discuss the conservation action plans outlined in the African Penguin Biodiversity Management Plan (BMP). The goal was to come away with a list of conservation actions that the SAFE program can effectively support to help reverse the decline in the wild population. This presentation provided an overview of the AZA's SAFE program, outline some of the potential conservation actions and discuss the threats and changing environmental conditions facing African penguins in the wild. This presentation will include a SANCCOB update.

Final Population Viability Analysis Results for the Penguin TAG - Lisa Faust, Population Management Center

In 2014, population biologists at Lincoln Park Zoo completed Population Viability Assessments (PVAs) for all AZA penguin populations. PVAs explore the long-term health and sustainability of these populations using a computer model that takes population demographics and genetics into account, as well as the management strategies of zoo populations. Key PVA results were presented for Penguin TAG SSPs, which point to needed management actions to assure long-term viability.

Reproduction 101 - Basic Overview of Egg Incubation and Chick Rearing - Lauren DuBois, SeaWorld San Diego

This presentation provided a general overview of Penguin egg incubation and hand rearing techniques. The focus will be on the basic needs required for successful chick hatching and rearing to include proper egg incubation, hatching parameters, nursery set up, diet requirements and proper monitoring of chicks through hand rearing.

Creative Nesting: Maximizing Your Exhibit Space - Sharon Jarvis, SeaWorld Orlando

A collaborative look at rookery and nesting areas discussed simple and complex enhancements that can create "more" useable breeding space. The presentation included a wide variety of temporary and permanent changes that can be made to exhibits for both temperate and sub Antarctic/Antarctic penguin species. Additional topics included a multi-institutional representation of nesting materials, substrates, "burrows," and rookery designs.

AARP(enguins) - Tricia McDeed, SeaWorld Orlando

Geriatric penguins in a zoological setting are becoming increasingly prevalent across AZA institutions. This longevity speaks to the husbandry expertise demonstrated by zoo professionals but at the same time creates new challenges and often the need for husbandry modifications to address the changing social, environmental and medical needs of elderly birds. While euthanasia plays a small part in what we do, the responsibility is immense and the decision to euthanize must be reached humanely and respectfully. Many institutions have implemented a Risk Assessment Tool to aid them in this process.

Cataracts in Crested Penguins: Prevalence, Risk/Protective Factors, and the Impact of Surgical Treatment on Penguin Welfare - Sarah Woodhouse and Stephanie Allard, Detroit Zoo

Eye examinations were performed on crested penguins at 8 AZA-accredited institutions. Cataracts were identified in 46.5% of Macaroni penguins and 45.5% of Rockhopper penguins. Husbandry information provided by each institution, as well as light intensity and ultraviolet light measurements collected in each

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ASAG Penguin Workshop Continued from page 9

penguin exhibit were examined statistically. This analysis suggested several risk factors and protective factors for cataracts in crested penguins. Although this information is useful in terms of prevention, it does not address penguins already affected by cataracts, and treatment options need to be explored. Surgical removal of cataracts was performed for five penguins at the Detroit Zoo. The impact of the surgery on the welfare of the individual penguins with a pre- and post-surgery behavioral study was assessed. Observed changes in penguin behavior and the implications of this type of surgical intervention on welfare were discussed.

[The Saint Louis Zoo's Penguin and Puffin Coast; Celebrating Twelve Years as North America's First Walk-through Sub-Antarctic Penguin Habitat](#) - *Mike Macek, St. Louis Zoo*

This presentation investigated the variables that had to be considered, the information gaps that existed and had to be overcome, and the lessons that were learned in the conceptualization, development and management of the Saint Louis Zoo's Penguin and Puffin Coast.

[Do You Waddle Play? A Collaborative Discussion of Penguin Enrichment Purposes, Compositions and Complications](#) - *Michelle Hartman, SeaWorld Orlando*

Zoos and aquariums have a variety of reasons for including enrichment in their habitats. Many use it strictly for the wellbeing of the animals. Some institutions elicit stronger natural behaviors not otherwise seen in a captive environment or to intensify the guest experience. Penguin enrichment items used by over twenty-five AZA accredited institutions are listed and/or described. Photos and videos of many of the items are included. Issues certain enrichment ideas have caused with the birds themselves or with guest perception were discussed. We can all increase our penguin, keeper and guest experiences by sharing our enrichment concepts.

[Using Enrichment to Create an Interactive African Penguin Encounter](#) - *Stacy Johnson, Denver Zoo*

One of Denver Zoo's African penguins trained for Denver Zoo's Animal Adventures, became ill during the training process, therefore ceasing all activities to facilitate her recovery. Once recovered and guest encounters resumed, she began demonstrating undesirable behaviors towards our guests. Various enrichment techniques were used to desensitize and redirect Juniper's energy to successfully reintegrate her with staff and guests for these Encounters. These enrichment tools have become an integral part of the Bird Department's training procedures for new encounter birds.

[Animal Management Procedures to Support Magellanic Penguin Artificial Insemination Programs](#) - *Lauren DuBois, SeaWorld San Diego*

This presentation reviewed the management techniques and husbandry requirements to support artificial insemination in Magellanic penguins. The focus of this talk included conditioning males for semen collection, nest set up, egg incubation and chick management.

[Evaluation of Ambassador Magellanic Penguins Behavioral and Corticosterone Responses to Behind the Scenes Tours](#) - *Julie Hartell-DeNardo, Zookeeper, Saint Louis Zoo. 2014 ASAG Travel Grant Recipient*

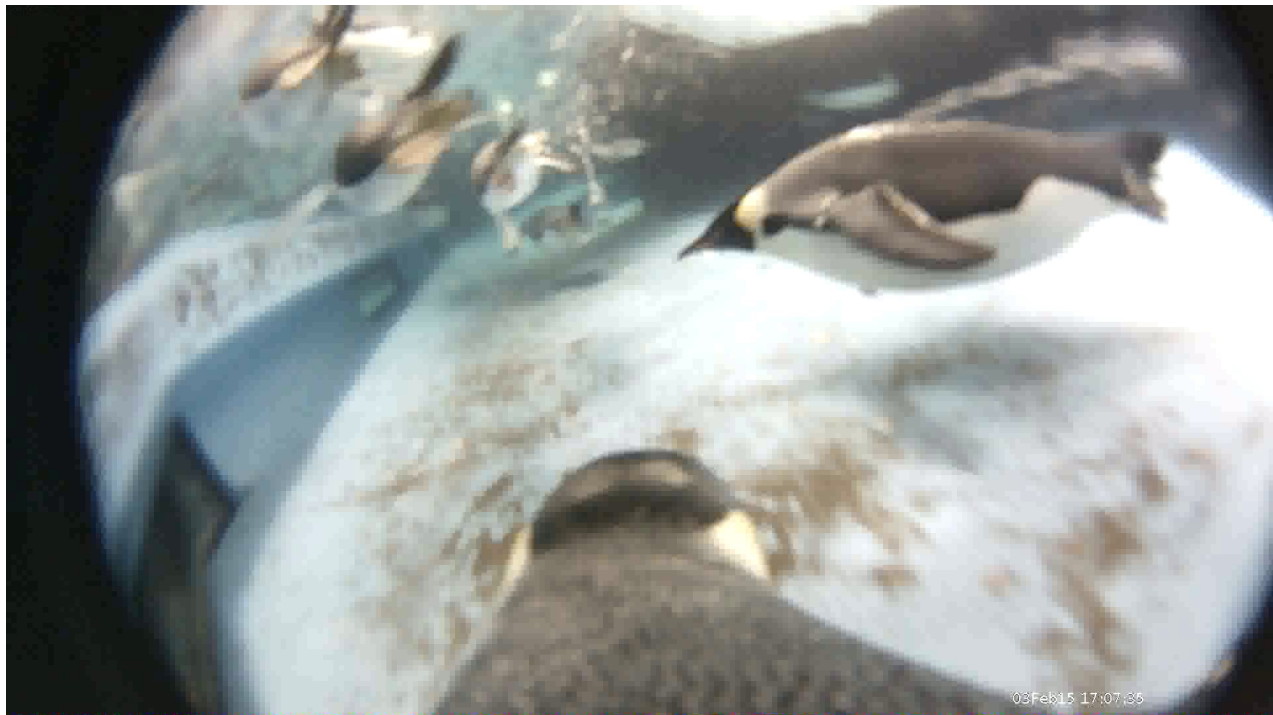
This presentation discussed the establishment of an excrement glucocorticoid metabolite (GCM) assay for Magellanic penguins and its application as a tool, in conjunction with behavioral observations, to evaluate individual responses to participation in a behind-the-scenes tour program. Study results indicate that some individuals may be more suited to the role of ambassador animals, and individual responses should be considered when choosing animals for guest interactions.

Pilot Study Tests Camera on SeaWorld's Emperor Penguins

Dr. Paul Ponganis, *Research Physiologist; Scripps Institution of Oceanography, University of California, La Jolla, CA, USA*

In February, 2015, Dr. Paul Ponganis tested a new backpack camera on emperor penguins at SeaWorld San Diego's *Penguin Encounter*. This was a pilot study to evaluate how the penguins tolerated the camera as well as the quality of the images. Ponganis plans to submit a grant proposal to the National Science Foundation to use the camera in the Antarctic on emperor penguins making foraging trips to sea. Emperor penguins make dives throughout the water column during these trips with regular dives as deep as 500 meters and as long as 10 minutes. The camera would be used to identify prey items and document swim behaviors during different types of dives. In addition to video, this new camera, made by Customized Animal Tracking Solutions, also collects data on depth, sea temperature, three- dimensional accelerations, compass headings, and body rotation.

The pilot study was a success. The emperor penguins tolerated the backpack camera well and freely dove and swam throughout the trial. The researchers were happy with the images because the wide angle lens almost always included the bird's head within the camera field. These results will be submitted as part of the grant proposal to investigate diving behavior and physiology in the Antarctic.



Snapshot of video from backpack camera on emperor penguin.

Photo provided Dr. Paul Ponganis.

African Penguins are a Pilot Species for the AZA SAFE Program

Steve Sarro and Gayle Sirpenski recently traveled to South Africa on behalf of African penguins and for AZA SAFE—Saving Animals From Extinction. This program is part of the **OnePlan** approach to species conservation. More and more, species are in need of action and attention and African penguins are in definite need. The stated mission of SAFE is “to combine the power of zoo and aquarium visitors with the resources and collective expertise of AZA members and partners to save animals from extinction” and “together we are saving the most vulnerable wildlife species from extinction and protecting them for future generations.” What this means for a managed program in AZA is that current action plans will be provided with the resources to implement recommendations; and programs in need of an action plan will be assisted in developing CAPs (Conservation Action Plans). In both cases, communication at all levels of the programs from development to implementation will be facilitated and consistent.

African penguins have been identified as one of the species to receive this type of focused attention. The following is the letter sent by Steve and Gayle to SSPs and TAGs regarding their recent trip to South Africa.

Dear Colleagues,

We are back in the U.S. after spending a week with AZA staff and a variety of stakeholders in Cape Town, South Africa, as part of the development of a three-year AZA SAFE Conservation Action Plan (CAP) for African penguins. We wanted to tell you a little bit about our experience.

We were fortunate to be invited to attend two full-day working group meetings with members of the South African Department of Environmental Affairs, SANParks, Cape Nature, SANCCOB and stakeholders involved with conserving the African penguin through a very detailed Biodiversity Management Plan. These meetings were vitally important for identifying the concerns and challenges these birds are facing across all, and in some circumstances within individual, colonies. We also visited three different penguin colonies, including Boulders Beach, Stoney Point, and Robben Island, and spent considerable time with these colony managers to gain an even greater understanding of what types of conservation efforts are needed to save this species.

After attending these meetings and seeing first-hand how the African penguin population has decreased by more than 60% from 2001 to 2009, we believe that what we are undertaking with AZA SAFE is absolutely critical. We are more convinced than ever that AZA member support of SANCCOB and AZA SAFE support of additionally needed conservation efforts will make a significant contribution to the preservation of African penguins.

Now that we are back, one of our main tasks will be to continue working with Debi Luke and Joel Merriman (AZA staff) to evaluate the conservation needs identified on our trip to determine which measurable conservation actions will be the best fit for inclusion in an AZA SAFE African Penguin CAP. Resources will then be solicited to support needs identified in this 3-year CAP. We will continue to share information as the African Penguin CAP is implemented.

This is an exciting time for those of us representing pilot species for AZA SAFE, but it's really an exciting time for the entire AZA community! Even if the species you represent hasn't been selected as a “SAFE Species” as yet, your support of AZA SAFE is important. Together, we are going to save species. That is something we can all be proud to say we are a part of.

Please let us know if you have any questions.

Best regards,

Steve Sarro, AZA African Penguin SSP Coordinator

Gayle Sirpenski, AZA African Penguin SSP Vice-Coordinator



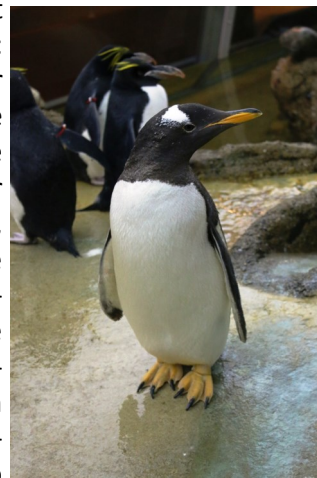
Left: African penguins at Boulder's Beach, South Africa.
Center: Steve Sarro and Gayle Sirpenski (center) .
Right: African penguin.

Photos courtesy of Steve Sarro and Gayle Sirpenski.

Pre- and Post-Occupancy Evaluation of Penguins at the Detroit Zoo

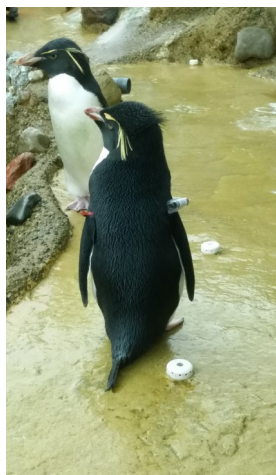
Stephanie Allard, Ph.D., Director of Animal Welfare & Grace Fuller, Ph.D., Manager of Applied Animal Welfare Science; Detroit Zoological Society, Royal Oak, MI, USA

The Detroit Zoological Society is currently constructing the new state-of-the-art Polk Penguin Conservation Center (PPCC) that will house four species of penguins: king (*Aptenodytes patagonicus*), macaroni (*Eudyptes chrysolophus*), rockhopper (*Eudyptes chrysocome*), and gentoo (*Pygoscelis papua*). The PPCC will incorporate leading-edge elements designed to allow for a wide variety of species appropriate behaviors and for the penguins to exercise greater choice and control over their environment. Specifically, the PPCC will feature a significant increase in land space, significantly deeper and greater water space, and more variety in substrates. The new habitat provides a valuable opportunity to compare the behavior and well-being of the same group of penguins in two very different living spaces. Multiple measures will be used to assess penguin welfare, including behavioral observations, biologging of diving parameters, and monitoring of health parameters such as weight and feather condition. Because the Detroit Zoo's penguin population includes many geriatric individuals, this study may also provide a unique insight into how each environment impacts the welfare of penguins that are aging and/or face specific health challenges such as cataracts and bumblefoot.



Gentoo penguin. Photo by Jennie Miller.

Twenty-seven penguins, representing all four species living in the current Penguinarium, were selected and include individuals of different sexes, age ranges, and health statuses. Each penguin is observed daily, from Monday to Friday. Observations, which include the individual behavior, location (including substrate type), and proximity to other penguins, will continue for a year after the penguins are introduced into the new habitat at the PPCC. In addition, penguin staff will help monitor nest use and body condition. To test methodology, data was collected on four penguins that underwent corrective surgery for cataracts. Cataracts are fairly common in captive crested penguins, and not surprisingly, susceptibility increases with age. Data was compiled prior to and following surgery and found that each penguin used significantly more of the habitat after the surgery. It is expected that more behavioral changes will be observed in the coming months as the penguins continue to adjust to their improved vision.



Rockhopper penguin wearing data logger. Photo by Jessica Jazwiak.

Technology is also playing a part in this study. Some penguins will be outfitted with data loggers, which are small trackers worn like a flipper bracelet that will record how much time penguins are spending in the water and at what depth. Data from penguins in the current penguin habitat will be compared to data after transfer to the PPCC, where the pool will be four times deeper, to assess if a deeper pool improves mean time in the water and frequency of diving at depth. There is currently no information on how pool size affects the percent of time spent swimming, preferred swimming depths, or the diversity of behaviors expressed in the water. Given that wild rockhopper penguins regularly dive to depths exceeding 60 m ([Tremblay and Cherel, 2000](#)), pool size and depth are likely to greatly influence behavior in the captive environment. Furthermore, penguins that spend more time in water may have decreased incidence of bumblefoot ([Reisfeld et al., 2013a](#)), suggesting that environments that promote increasing swimming are likely to have positive welfare benefits.

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Finally, the feasibility of using molted feathers to track changes in corticosterone over time will be evaluated. Most penguins show a decline in corticosterone levels prior to molting which is thought to minimize degradation of proteins needed to produce new feathers ([Cherel et al., 1988](#)). Thus, birds that show increased levels of corticosterone prior to molt may be at risk for poor feather production and reduced physical welfare. Therefore, monitoring feather condition and molt status will provide additional information about physiological stress levels in relation to the habitat change.

The Detroit Zoo continues to strive for the best in quality animal care. Through these investigations the researchers hope to better understand how physical and social factors impact the welfare of individual penguins and to use the information to improve the wellbeing of these remarkable birds.

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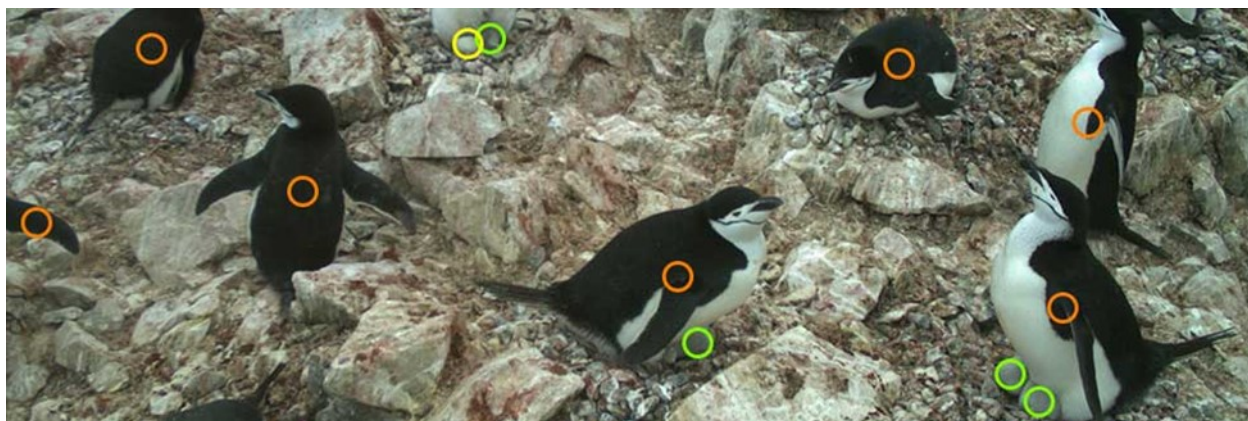
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Photo by Linda Henry.

Be a Penguin Watcher

Citizen science is on the rise and citizen scientists are contributing in many ways. Programs such as Frogwatch (<https://www.aza.org/frogwatch>) and Project Feeder Watch (<http://feederwatch.org>) have helped to both further the understanding of species distribution and increased conservation awareness. Now, a new website has been launched through the Zooniverse called **Penguin Watch** (www.penguinwatch.org) designed to make photographs from remote sensing cameras available for citizen scientists to count penguins, chicks and other birds in the colonies. In addition, the website provides a blog and discussion tabs as well as a list of partners. Participants can create a profile for recognition of repeated contributions or remain anonymous. Learn more under the *Science* tab at the website. This would be a great activity to add to Education programs or highlighted in conversations as a way for zoo and aquarium visitors to get involved with penguins.



This image, downloaded from www.penguinwatch.org citizen science website, shows how adults and chicks are counted by a click of the mouse. Other tools are provided such as a field guide to identify species, and interactive feedback or discussion about particular images.

First Announcement for International Penguin Congress 9 Cape Town, South Africa, 5-9 September 2016

On behalf of the Local Organizing, and International Scientific Committees, it gives me pleasure to announce the dates of the 9th International Penguin Congress. We look forward to welcoming you to Cape Town from the **5-9 September 2016**, with an icebreaker planned for the evening of the 4th September.

The venue will be announced shortly in the 2nd Announcement for IPC9, and it will also direct you to the website. Additionally, there will be some ideas of pre- and post- conference tours highlighted so that you can start making your travel arrangements accordingly. In the meantime, if you have any queries, please contact me at lwaller@capenature.co.za.

With best wishes,

Lauren Waller (Chair for IPC9)

Local Organizing Committee:

Sue Kuyper (University of Cape Town)
Leshia Upfold (Department of Environmental Affairs)
Margaret Roestorf (SANCCOB)
Stephen van der Spuy (SANCCOB)
Barbara Barham (University of Bristol)

International Scientific Committee:

Peter Barham (University of Bristol)
Dee Boersma (University of Washington)
Pablo Garcia Borboroglu (Global Penguin Society/
CONICET-Argentina)
Lloyd Davis (University of Otago)
Sue Murray (Yellow-Eyed Penguin Trust)
Phil Trathan (British Antarctic Survey)
Heather Urquhart (New England Aquarium)

Semen Collection in the King Penguin (*Aptenodytes patagonicus*)

Justine K. O'Brien, PhD, Scientific Director; SeaWorld Parks and Entertainment Inc., SeaWorld and Busch Gardens Reproductive Research Center, San Diego, CA, USA

The *ex situ* king penguin population, which is managed as a sustainable “Green” species survival plan (SSP) under the direction of the Association of Zoo and Aquariums, consists of 265 individuals across 15 institutions¹. As with any managed species, the sustainability of this population is reliant on adequate genetic representation of individuals in the ensuing generations. Studbook data show that 53% of animals aged 10 years or more have not yet reproduced or have only one living offspring^{1,2}. In conjunction with low rates of egg fertility (25-35%³), it is clear that genetic diversity may be lost from the zoological king penguin population as animals age. Information on the species’ sperm biology has been recently documented, and results showed that males as old as 32 years continue to produce high quality semen based on *in vitro* evaluations of fresh and frozen-thawed samples³. It follows that semen collection from non- or under-represented males for subsequent artificial insemination (AI) could be a valuable tool for maintaining existing genetic diversity before it is lost once the male dies. This is supported by recent results in the Magellanic penguin (*Spheniscus magellanicus*) where chilled⁴ and frozen-thawed semen (O’Brien et al., unpublished) was used to produce offspring via AI. Many hand-raised king penguins have some degree of human imprinting and may display breeding behavior towards their keeper staff. The purpose of this article is to highlight the main steps in collecting semen using a cooperative technique, for future use in genome banking (sperm cryopreservation) and AI. A description of the cooperative semen collection method has been published for the king penguin² and was modified from the technique developed in the Magellanic penguin.⁵

At the beginning of the breeding season, imprinted males begin to display increased interest in familiar keeper staff, and may exhibit breeding behaviors such as vocalizations, flipper spreading, head shaking and body lifting. Such breeding behavior typically starts in January under a lighting schedule set to approximate natural seasonal changes occurring at 77° 51’S, 166° 40’E (McMurdo Station, Antarctica). The familiar keeper staff(s) should encourage such displays by mimicking those vocalizations. To encourage a breeding position, keeper staff are positioned in a seated position, in the exhibit, with their legs outstretched and covered with a clean towel (Fig 1). If some males are stimulated by a rubber boot, it may also be helpful to place a boot on the lap of the keeper. The male is then encouraged to mount the legs of the seated keeper and moderate pressure is applied to the cloacal vent to simulate a female cloaca. If breeding behavior continues, a second staff member assists with providing moderate, focused pressure to the cloaca to encourage ejaculation. During ejaculation, the cloaca everts and a ventral muscle contraction is usually detected by the seated keeper. Semen may also be visible on the cloacal vent after ejaculation. Immediately after collection, the male should be reinforced with vocal and tactile stimulation.

Once the male will reliably ejaculate they will need to be conditioned to accept rapid cleaning of the cloacal vent with sterile gauze moistened with sperm-friendly media (e.g. Androhep Enduraguard PlusTM, Minitube of America) which was pre-warmed to 21°C. This cleaning process is important to remove residual urates and fecal matter from the cloaca. It is useful to perform this cleaning step when the cloaca is partially or fully everted to ensure the area which comes into contact with semen will be free of urates and feces. The cleaning process should be performed quickly (ie over 5-10 s) as the action of wiping the cloaca stimulates ejaculation. For semen collection, a 20ml polystyrene sterile collection vessel (#14310-684, VWR, Radnor, PA) is held over the surface of the cloacal vent by the collector until breeding behavior (feet padding, tail flicking) by the male ceases (i.e. coincident with the ventral muscle contraction). The collector’s gloved thumb and forefinger encircles the rim of the collection vial and is held firmly over the cloaca during the procedure, with moderate pulsating pressure applied to the cloaca by the collector’s gloved hand. The remaining part of the

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the collector's hand encircles the collection vessel to avoid exposing spermatozoa to the low ambient temperature of the habitat

Immediately after ejaculation has occurred, the collection vial (held in the collector's closed hand) is taken out of the exhibit for processing within 30s of collection at 19-21°C. For processing, semen is removed from the collection vial using a calibrated pipette and sterile pipette tip and transferred to sterile polystyrene tube (classified as non-toxic to sperm; e.g. BD Falcon™ or TPP®). Semen volume is recorded and an equal volume of semen extender is added. Semen extender can be obtained from Continental Plastic Corp. (Delevan, WI) and comprises Beltsville Poultry Semen Extender⁵ containing 10 mg/ml gentamycin sulfate. Next, the tube of semen is placed into a cooling device (Equitainer, Hamilton Research, South Hamilton, MA) to facilitate slow cooling to 5°C, after which semen is evaluated for sperm and semen characteristics within 30 min of collection, and processed for cryopreservation².

For copies of a video showing the semen collection procedures, please contact Linda Henry (linda.henry@seaworld.com). This is a SeaWorld Parks and Entertainment Technical Contribution no. 2015-05-C.

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Acknowledgments: Staff at SeaWorld San Diego's Penguin Encounter are thanked for their assistance with the development of semen collection procedures, in particular Lauren DuBois and Linda Henry.

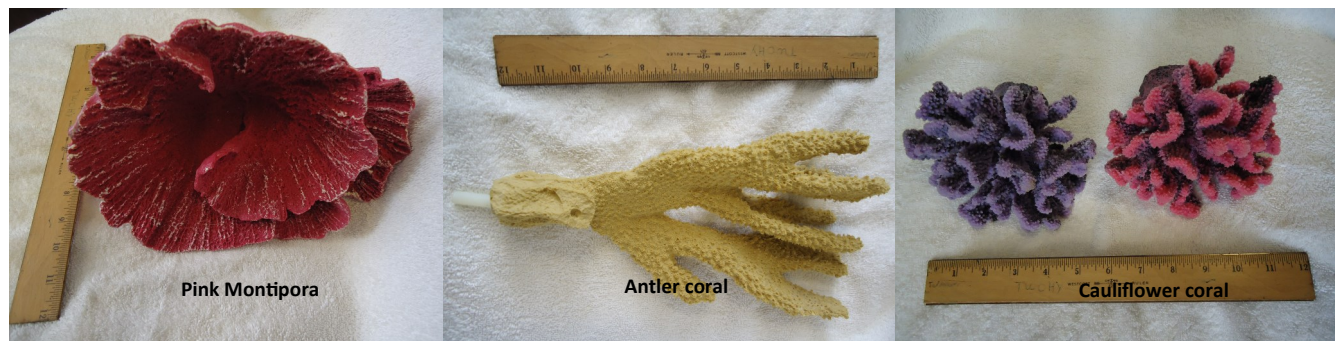


Fig. 1. Semen collection from a king penguin. Note the protective eye-wear worn by both staff. Photograph: M. Aguilera, SeaWorld San Diego.

Penguin Enrichment Ideas

We received positive feedback on the “Waterpark for Penguins” featured in the last issue. Thanks again to Omaha’s Henry Doorly Zoo for sharing their idea. More on this topic is forthcoming as a result of the recent Penguin Workshop. Here are a few more ideas until then:

At SeaWorld San Diego keepers are using large aquarium “corals” as naturalistic enrichment interactives. The items are light enough to be easily manipulated in the pool but large and heavy enough to remain in the water column or on the pool bottom. Aquarium corals can be purchased in a variety of shapes and colors, are already designed for durability in the aquarium setting and penguins seem very interested in them. And many zoos and aquariums might already have these items available to them. At SWSD these “toys” are placed directly in the pool, where they remain for 5-7 days, and are then removed by divers during normal maintenance activities. Keepers vary the timing and choice of enrichment to keep the items novel and interesting. Large-scale artificial corals, without thin projections should be selected to avoid ingestion hazard. Some examples include:



Another enrichment item used at SWSD is frozen krill balls or chunks. Krill comes in frozen blocks. These blocks can be broken up (with a rubber mallet) into small, manageable chunks; or defrosted slightly in the refrigerator, formed into balls while still partially frozen and quickly refrozen. Ultimately shape seems not to be an important factor for the penguins. Krill chunks are tossed to a central spot in the pool, away from the skimmers. Penguins treat the floating krill chunks as if they are small piñatas, punching the krill until the small, defrosting bits fall off, eating the bits, then punching the chunk again. SeaWorld’s guests enjoy watching the penguins interact with each other during these enrichment sessions. When using this enrichment item (or if alternately using frozen fish balls) consider water temperature and food-water contact time to assure food quality is maintained. Krill is a novel diet item used only in this context at SWSD and the water temperature is cold enough (42oF/~4oC) to assure food quality during the time it takes for the items to be consumed.

Marwell Zoo in the UK posted a video showing an enrichment item they introduced to their Humboldt penguins: a large water bottle, filled with fish, placed in the pool so that it floats with the spout depositing the fish into the water as birds interact with it. The birds appear to be more interested in the novel object than consuming the fish inside it. See the video [here](#).

Penguin Listserv Update

Past issues of the PCN have focused on collating relevant information shared on the Penguin Listserv. Not every response is sent via the listserv forum so PCN often digs deeper to share topics important to penguin managers. In this issue we thank Sara Mandel (Aquarium of the Pacific) and Vicky Croisant (Akron Zoo) for sharing the responses they received to their Listserv results.

Coin Ingestion and Detection:

Visitors often toss objects (e.g., coins) into habitats unaware that penguins are attracted to the shiny objects. One way to increase awareness about this unwanted behavior is to post signage to discourage the behavior. However, research suggests that signage intended to discourage unwanted behaviors may have the opposite or “boomerang” effect depending on how the information is presented. (There is a body of research publicly available from the National Park Service on the effectiveness of signage in influencing visitor behavior.)

Whether or not signage is present, penguin managers must still attend to concerns of coin or other foreign body ingestion. Shiny, metal objects represent the most appealing of these prompting the listserv question below about how to detect ingestion prior to clinical concern.

Original Listserv Question		What do other institutions use for detecting foreign bodies in their penguins? Do you use portable body scanners or something else? Have you found that some metals aren't picked up by the detectors?
Aquarium of the Pacific	Magellanic	We use the Garrett Super Scanner V Security Wand , which is the same one as the Toledo Zoo. I asked the listserv about metal detectors because we had one of our juveniles eat a small piece of metal wire. The wire didn't show up on the metal detector, but coins and other metal does (if it's large/thick enough). The wire itself will get a positive reading, but if I put something like my fist around it, it will read as a negative scan. I like the idea of a plastic box to get the radiographs of the birds. I use the wand on our birds as often as I can, but the rebar in the exhibit can make it difficult.
Milwaukee County Zoo		We do yearly x-rays of the penguins to check for coins after the busy season. We have a plastic box that the penguins lay in for a quick x-ray. It works well. We tried metal detectors but they were too sensitive; they picked up the rebar in the exhibit and the metal in our boots. The penguins had no issues with the wands but we found them to be very unreliable.
Woodland Park Zoo	Humboldt	We use a metal detector wand like TSA.
Toledo Zoo	African	We use a Garrett wand that is more commonly used as a security device at checkpoints. We have used it with good results for both our African Penguins and waterfowl species that like to pick up shiny items.

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Penguin Listserv Update *Continued from page 19*

Pool Algal Control Survey Results:

**Q1 Describe the oxidants you use in the operation of your life support system and pool, if any.
(Check all that apply)**

Answered: 8 Skipped: 0

Answer Choices	Responses	
Ozone	50.00%	4
Chlorine	37.50%	3
Bromine	12.50%	1
Other	0.00%	0
None	12.50%	1
Total Respondents: 8		



Magellanic penguins at SeaWorld San Diego.

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Penguin Listserv Update *Continued from page 20*

**Q2 What is the target range in pool water
for each oxidant used? (if zero, note that)**

Answered: 6 Skipped: 2

Answer Choices	Responses
Ozone ____ ppm (not ORP values)	50.00% 3
Chlorine ____ ppm	83.33% 5
Bromine ____ ppm	33.33% 2
Other (name and concentration)	0.00% 0

#	Ozone ____ ppm (not ORP values)	Date
1	we don't measure ozone in ppm- injected based on ORP readings in millivolts	11/15/2014 12:24 PM
2	0	11/14/2014 9:17 AM
3	not sure	11/13/2014 11:23 AM
#	Chlorine ____ ppm	Date
1	<1ppm	11/14/2014 10:24 AM
2	<0.01ppm	11/14/2014 9:17 AM
3	We run our pool at human pool chlorine levels	11/13/2014 7:27 PM
4	< 2.5 mg/L	11/13/2014 3:05 PM
5	0	11/13/2014 11:23 AM
#	Bromine ____ ppm	Date
1	<0.05ppm	11/14/2014 9:17 AM
2	o	11/13/2014 11:23 AM
#	Other (name and concentration)	Date
	There are no responses.	

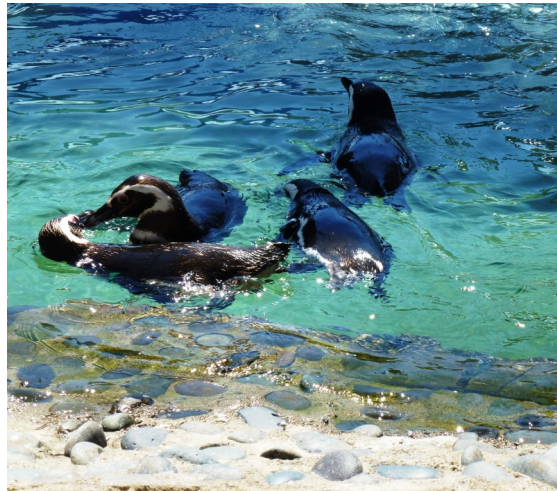
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Penguin Listserv Update *Continued from page 21*

Q3 What methods do you use to discourage/control algae growth on pool walls and rockwork? (Check all that apply)

Answered: 8 Skipped: 0

Answer Choices	Responses
Shade (roof, awning, trees, etc)	0.00% 0
Continual levels of oxidants in water (chlorine, bromine, etc)	62.50% 5
Brief high concentration of chlorine in water (animals isolated elsewhere) for breakpoint chlorination or sterilization.	37.50% 3
Phosphate reduction additives	25.00% 2
Barley straw (or extract)	12.50% 1
Copper	0.00% 0
Other chemical algaecide	0.00% 0
Mechanical removal (scrubbing)	75.00% 6
Foam fractionation to reduce organic nutrients (protein skimmers)	12.50% 1
Other.	25.00% 2
Total Respondents: 8	



Magellanic penguins at the Aquarium of the Pacific.

Continued on page 23

Penguin Listserv Update *Continued from page 22*

Q4 What's the approx. volume of the pool?

Answered: 8 Skipped: 0

#	Responses	Date
1	~10,000 gallons	11/15/2014 12:24 PM
2	25,000 gallons	11/15/2014 12:46 AM
3	8000 gallons	11/14/2014 10:24 AM
4	5800 gallons	11/14/2014 9:17 AM
5	15000 gallons	11/13/2014 7:27 PM
6	2000 gallons	11/13/2014 3:05 PM
7	5000 Gallons	11/13/2014 2:56 PM
8	30,000	11/13/2014 11:23 AM

Q5 What percentage of the pool area is shaded, if any?

Answered: 7 Skipped: 1

#	Responses	Date
1	~30-40% at any given time	11/15/2014 12:24 PM
2	None (At least none intentionally. Attached building and trees in area provide some shade depending on position of sun.)	11/15/2014 12:46 AM
3	<5%	11/14/2014 10:24 AM
4	None	11/13/2014 7:27 PM
5	25%	11/13/2014 3:05 PM
6	10-20% depending on the time of year	11/13/2014 2:56 PM
7	parts at parts of the day.	11/13/2014 11:23 AM

Continued on page 24

Penguin Listserv Update *Continued from page 23*

**Q6 How often do you empty the pool
to do a thorough cleaning?**

Answered: 8 Skipped: 0

#	Responses	Date
1	100% water change & chlorine scrub 2 times per year	11/15/2014 12:24 PM
2	Variable by season and temperature. More than weekly in the warmest portions of the summer. Less than monthly when cold.	11/15/2014 12:46 AM
3	As needed	11/14/2014 10:24 AM
4	never	11/14/2014 9:17 AM
5	Every 6 weeks or so during summer once in the winter	11/13/2014 7:27 PM
6	Summer months, almost once a month. In the winter, once every 3 months	11/13/2014 3:05 PM
7	once a year	11/13/2014 2:56 PM
8	every other month.	11/13/2014 11:23 AM

**Q7 Briefly describe your overall
algae control strategy.**

Answered: 8 Skipped: 0

#	Responses	Date
1	bleach clean occasionally, scrub daily if possible to prevent/treat algae growth (water clarity great!)	11/15/2014 12:24 PM
2	Dump, scrub and refill. We are also looking for options for algae control to save water and pool downtime.	11/15/2014 12:46 AM
3	Remove nutrients for algae, allowing chlorine to be freed up, physical pool maintenance	11/14/2014 10:24 AM
4	water changes, filter maintenance, and scrubbing	11/14/2014 9:17 AM
5	Chemical control	11/13/2014 7:27 PM
6	Generally we kept chlorine levels between 2-2.5mg/L and dosed lanthium chloride to keep phosphates down. The water was also filtered through a sand filter- but we found that the lanthium chloride would gum of the filters.... So i am not sure how effective the lanthium chloride and sand filter combination was.	11/13/2014 3:05 PM
7	ozone and scrubbing	11/13/2014 2:56 PM
8	ozone for green water, chiller for algae on rocks.	11/13/2014 11:23 AM

Continued on page 25

[Penguin Listserv Update](#) *Continued from page 24*

**Q8 Which of the following best describes your institutional attitude toward algae on pool walls and rockwork?
(Check all that apply)**

Answered: 8 Skipped: 0

Answer Choices	Responses	
It is a natural phenomenon and we mostly don't worry about it.	25.00%	2
It is undesirable and we control it the best we can, but some algae is acceptable	50.00%	4
A fine layer of surface algae is unavoidable, but we do not let thick mats or 'carpets' develop.	75.00%	6
Our goal is "no algae" and we aggressively treat/clean to control it.	25.00%	2
We don't do anything special and have little problem with algae.	0.00%	0
Total Respondents: 8		



Magellanic penguins at the Aquarium of the Pacific.

News and Updates

David McFarlane, this issue, shared the challenges faced by the [Yellow-eyed Penguin Trust](#) during the past chick season and their Facebook page continues to post the ongoing challenge of **barracuda attacks** on these birds. **Seventy-seven penguins** are currently under care in rehab centers around Otago, New Zealand. The YEPT, in collaboration with the Department of Conservation (DOC) Coastal Otago Services, has put out an urgent appeal for fish donations to feed birds under care. Already the Ngai Tahu Fisheries have offered silversides and mackerel and King Salmon, Akaroa Salmon and Sanfords have provided fish support. Wellington Zoo, Air New Zealand, Massey University's Wildbase and St. Kilda Veterinary Centre have helped to provide treatment or support for the most seriously injured penguin patients. This is a developing situation that is taxing available resources. Penguin Rescue [Katiki Point Penguin Charitable Trust](#) and [Penguin Place](#) are rescue organizations previously featured in the PCN. **Monetary donations are welcomed to help support the cost of penguin rescue.**

*[Eds note: Dr. Onnie Byers, Chair of the IUCN's Conservation Breeding Specialist Group, gave a heartfelt presentation on the **One Plan Approach (OPA)** at the recent International Flamingo Symposium (San Diego, October 2014). Her remarks resonated with me as so many penguin species face ever increasing challenges.]*

Though One Plan is not a new concept, it works to combine the power of all stakeholders in species conservation action. Zoos and Aquariums worldwide are joining together to raise awareness and set conservation action goals. The OPA is administered by the **Conservation Breeding Specialist Group (CBSG)**, a Specialist Group of the **International Union for Conservation of Nature (IUCN)** Species Survival Commission (SSC). The **AZA SAFE** initiative, which has identified African penguins as a pilot species, is part of the One Plan Approach. See article this issue and visit the [CBSG website](#) to learn more.

Overfishing and fisheries mismanagement have been identified as key threats facing penguins long-term population sustainability. For the Spheniscus, anchovy and sardine are important prey items and have been a focus of human-penguin fishery competition and fisheries management controversy. In South Africa, where the African penguin is experiencing a rapid decline in population there has been a focus on the association between prey availability and this species' survival. In 2008, fishery exclusion zones were implemented to assess the impacts of fishing on this species. Results of the four-year study showed that African penguins had to extend their foraging range when fisheries were located near to their colony. But because annual fish abundance can vary with both human and natural pressures the results have sparked some debate on the precise relationship between penguin populations, fish abundance and fisheries management. After convening last October, a panel led by **BirdLife International** plans to make recommendations to the South African Department of Agriculture, Forestry and Fisheries. Read more at [Nature](#) and at the [Responsible Fisheries Alliance](#).

The European Association of Zoos and Aquariums (EAZA) continue their **Pole To Pole campaign** which began in 2013. The campaign focuses on small changes in human behavior that positively influence polar species. Supporting members include AZA, IUCN/SSC and the Antarctic and Southern Ocean Coalition. Register your pledge to make a difference at [PoletoPole](#).

Videos released in January and March give a penguin-eye view of life at sea. From the Tawaki Project there are HD images from a camera logger showing a **foraging trip of a yellow-eyed penguin**. In another minute-long video, the [little penguin perspective](#) is seen. This footage, released by Phillip Island Nature Parks, used a "GoPeng Pro" critter camera developed by the [National Polar Research Institute](#) in Japan.

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News and Updates *Continued from page 26*

The London Zoo's Humboldt penguins waddled their way into the news in March ([Penguin waddle put to the test](#), BBC News). Researchers from the Royal Veterinary College and the University of Texas were there to watch penguins walk. Researchers used force platforms to quantify foot placement and pressure relative to body weight distribution. They plan to examine their findings from the evolutionary perspective. Fascination with the penguins' waddling gait is not new. In 2000, scientists with Berkeley's Locomotion Laboratory traveled to SeaWorld San Diego to videotape emperor penguins walking across a platform. The goal of their research was to examine the energetics of waddling in penguins. Read a brief communication on their findings [here](#).

Margaret Roestorf announced in February that she has stepped down from **SANCCOB** and has accepted a position with St. Luke's Hospice. In a letter emailed to North American penguin specialists, Gayle Sirpenski and Steve Sarro relayed the news. They went on to say that Margaret's determination and influence over these past years has helped to improve the quality of animal care at SANCCOB. She has also "...cultivated many important relationships with our AZA members." **Dr. Stephen van der Spuy** has taken over as the new CEO of SANCCOB.

Have **penguins lost the ability to taste** fish? Can they taste the "salty goodness"? A recent study contends that penguins can only taste sour and salty foods. The work is based on a genetic study where taste genes were noted as "missing". See References, this issue.

The Cornell Laboratory of Ornithology *All About Birds* blog in January featured ***Life in an Adelie Penguin Colony—Live from Antarctica***. The Lab's Science Editor, Hugh Powell, hosted the web-casts from Palmer Station that featured the work of scientists examining the Antarctic food web. The videos can be viewed at the [All About Birds website](#).

Even the famously cold-hardy emperor penguin may have found Ice Age Antarctic winters too harsh. A recent study found that emperor penguins, known for breeding during Antarctic winter, were able to breed in just a few locations around Antarctica during the last Ice Age, where polynyas were situated near stable ice. The researchers believe that one of these polynyas was the Ross Sea which functioned as a refuge for one such population; and, as a result, **emperor penguins from the Ross Sea are genetically distinct** from emperor penguins found in other areas of Antarctica. Read more about this work at the [University of Oxford website](#).

Archaeological evidence reveals **human impacts** on New Zealand wildlife as early as the 1200s with the arrival of Pacific Islanders. It appears that as the new human arrivals ate the **waitaha penguin** into extinction, the yellow-eyed penguin began taking a firmer foothold in the vacated niches. Read more [Live Science](#).

Antarctica has been warmer than usual this year. At the end of March, the **Antarctic Peninsula** showed temperatures **exceeding 60F (15.5C)** which records suggest may be the highest temperature ever recorded on the Antarctic continent. This temperature beats what the *Antarctic Sun* reported as a recorded high temperature of 59F (15C) at Vanda Station on 5 January 1974.

As of January 2015, the **Chinstrap Penguin SSP** was upgraded to a **Green Program**. Congratulations to Program Leader, Bob Flores.

The **2015-2020 Penguin Regional Collection Plan (RCP)** has been submitted to the AZA WCMC and is awaiting approval.

Facebook reminder: Be sure to Like the **Penguin TAG on Facebook** (www.facebook.com/PenguinTAG) in order to get the latest updates.

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Websites We Like

SOUTHERN FRIED SCIENCE: <http://www.southernfriedscience.com>. This website features short writings/blogs on important marine topics. Check out **Unhappy feet – why we need more than a day of penguin awareness** by Chris Parsons at <http://www.southernfriedscience.com/?p=18133>.

Events and Announcements

13-18 April 2015: The **5th Annual Penguin Promises “Waddle for a Week”** to support African penguins. This event is held by the **Animal Keepers Association of Africa** to “raise awareness about the plight of this iconic species by waddling for a week from Gansbaai to Simonstown”. The “What YOU can do” tab gives practical guidance on how to preserve penguins and the marine environment. Visit www.penguinpromises.com.

22 April 2015: **Earth Day.** www.earthday.org.

25 April 2015: **World Penguin Day.** Celebrate the day with the Greensboro Science Center, Greensboro, North Carolina by doing the **Tuxedo Trot** 5K Run for the Penguins. Proceeds will benefit SANCCOB.

2 May 2015: **International Migratory Bird Day.** <http://www.birdday.org>.

16 May 2015: **Endangered Species Day.** All penguins in human care are charismatic ambassadors for their taxa and a flagship species for the marine environment. Increase awareness for the plight of yellow-eyed penguins and African penguins. Celebrate Endangered Species Day every day. <http://www.endangered.org/campaigns/endangered-species-day>.

18-22 May 2015: **12th Annual Effects of Oil on Wildlife**, Anchorage, Alaska. <http://www.eowconference.org/dir>.

June is **Zoo and Aquarium month**.

8 June 2014: **World Oceans Day.** Make an ocean promise! <http://worldoceansday.org>.

9-13 September 2015: The International Congress of Zookeepers announced its upcoming **ICZ Congress** in Leipzig, German. Go to www.iczoo.org/leipzig2015.php for details or email info@iczoo.org with questions.

17-21 September 2015. *Conservation Track* for the **2015 AZA Annual Conference**. The Conservation sub-committee will gather the information and develop the selected proposals into sessions. Salt Lake City, Utah, hosted by Utah's Hogle Zoo.

17 October 2015: **African Penguin Awareness Day.** www.facebook.com/africanpenguins

26-30 October 2015: **2nd World Seabird Conference**, Cape Town, South Africa. <http://www.worldseabirdconference.com/2nd-world-seabird-conference>.

4-9 September 2016: Plan your budgets now for the **International Penguin Congress 9**, Cape Town, South Africa. Contact waller@capenature.co.za with questions.